

REMARKS

Claims 1 to 7 and 9 to 11 are pending in this application.

The Rejection under Prior Art

Claims 1 to 11 are rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,780,701 ("Kaska et al.") in view of U.S. Patent No. 6,358,486 ("Shan et al."). Kaska et al. is directed to a process for alkane group dehydrogenation with an organometallic catalyst. Shan et al. discloses a mesoporous material.

Claim 1 is amended herein to substantially incorporate the recitations of original claim 8 (now cancelled). In particular, claim 1 now recites that the pincer complex is bonded to the inorganic oxide support by means of a bridging group.

Neither of the cited references, whether taken individually or in combination, discloses or suggests this feature of the claims.

The bridging compound is a significant feature because it creates a heterogenized composition. In other words, the present invention is an immobilized catalyst because it is embedded with the binder via the bridging compound. Heterogenized catalysts have significant advantages over traditional, homogeneous (i.e., catalyst which is in the same phase as the reactant) catalysts. A primary advantage is that the heterogenized catalyst does not require catalyst/reaction effluent separation or catalyst recovery. In this invention, the active moiety in the catalyst is covalently bonded to the catalyst support (i.e., the mesoporous material). It will not suffer from leaching into the reactant stream itself. Leaching results in the loss or dilution of the catalyst, thereby reducing its efficacy. Furthermore, leached catalyst must be recovered or its

loss in the effluent stream must be remedied by continuous addition of catalyst make-up. Either way, significant extra costs are incurred. Therefore, the heterogenized catalyst of the invention is much more efficient and less expensive than a homogenous catalyst.

The Kaska et al. patent discloses a homogeneous catalyst. It suffers from the shortcomings described above. Consequently, the present composition is far superior to the catalyst disclosed in Kaska et al.

Secondly, the heterogenized catalyst of the invention allows for a different reaction scheme, as shown in the Fig. 1 of the present application. This is different from the homogenous catalyst reaction scheme, wherein the soluble catalyst flows along with reactor effluent. As is known in the art, conversion of alkanes to alkene is an equilibrium reaction and is thermodynamically unfavored at low temperature. A way to make this more favorable is to remove one or more of the reaction products right away to favor the product formation. This is not possible in a traditional homogenous catalyst vessel scheme.

However, the present invention allows the separation of reaction products in the catalytic distillation reactor 10. This provides reaction thermodynamics favoring an enhanced conversion of the reactant. Furthermore, the mesoporous material used and the reaction scheme lead to an overall increase in available catalyst surface area and an increase in catalyst dispersion (as compared to the homogeneous scheme). The result is a simultaneous improvement in both reaction kinetics and thermodynamic reaction conditions.

Neither of the cited references achieves or suggests the advantages of Applicants' claimed invention. Accordingly, all of the pending claims are submitted to be allowable over the cited prior art. Reconsideration and withdrawal of the rejection are respectfully requested.

Other Matters

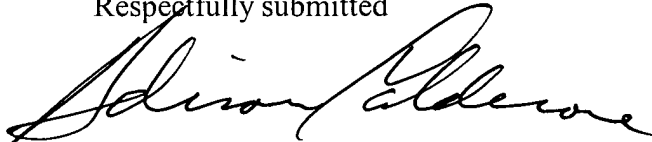
The Declaration was deemed to be defective because of a non-initialled, non-dated alteration. Preparation and submission of a new Declaration will be considered.

The non-elected claims 12 to 23 have been cancelled.

CONCLUSION

For at least the reasons stated above all of the pending claims are submitted to be in condition for allowance, the same being respectfully requested.

Respectfully submitted

A handwritten signature in black ink, appearing to read 'Adrian Calderone', written in a cursive style.

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